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STUDY PROJECT

TELECOMMUNICATION TRAINING FOR ARMY NATIONAL GUARD

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News reports of reductions in military strength and multiple base closings confirm the obvious; that some critical decisions must be made in the size of the modern military force. The cuts in defense are called streamlining for fast reaction; cutting to a smaller quality force; or reduction to the bone. The intent depends on where you stand on the reduction line. But the unquestionable imperative is "the quality of the force."

This paper examines one part of the total force and the developing status of training required for the Army National Guard (ARNG). First, we will look at the perceived training and readiness level of the guard; second, traditional methods of guard training will be discussed and the inherent limitations of the traditional training system; third, training strategy in the Army and ARNG; fourth, the training system via telecommunication networks and fifth, possible cost savings; and sixth, conclusions will be drawn on distance training and possible security issues.

Training and Readiness of the ARNG

There are turf differences between the Army's Active Components (AC) and Reserve Component (RC). These differences are becoming battle lines and should be given attention. However, this is not the purpose of this paper. The reason for examining the active force is to see how they generally compare in training and to understand the distance learning strategy of the Army. While some comparisons are made, this discussion will be directed toward the perception of influential voices concerning the training of reserve forces and stated shortfalls in reserve training. Initially, these will be taken at face value for argument and, based on this assumption, attempts will be made to create a NEW distance learning system.

The Army's Reserve Components purpose is to provide mission-capable units and individuals to augment the active force in time of war or national emergency. A primary assumption is that the guard will serve/perform their mission as effectively as their active counterparts. The ARNG has a federal wartime mission and organizationally is fully integrated into the total force. In addition, the ARNG has a state mission to provide units which function under state authorities. States retain command of ARNG not in Federal service.

In a General Accounting Organization (GAO) report to the Chairman, House Armed Services Subcommittee on Military Personnel and Compensation, in June 1989, the GAO describes:

> *The role of the Army Reserve and the Army National Guard has never been more critical to an effective national defense than it is today. Because of the cost of maintaining a regular Army capable of meeting (all) potential threats has long been recognized as prohibitive from an economic standpoint, the Army's leadership has developed defense strategies that place increasingly greater reliance on the Reserve Componets. Since the Army's Reserve Componets make up more than half of the defense force, it is critical that Army leaders ensure that reserve soldiers and units are highly trained.*

With increasing budget pressures, there is likely to be a move toward a hollow active force which can be quickly manned through RC mobilization. In this scenario, a substantially greater fraction of total force manpower would be in the Reserve Componets. Effective training methods for the RC are a primary limiting factor. Drug interdiction and aid in response to natural disasters have similarly complex aspects for the ARNG. The resulting training requirements for the Reserve Componets are very difficult to satisfy.

In testimony before the Committee on Armed Services, it was stated, regarding skill qualifications of National Guard and Reserve members:

> *Military service data indicate that about one of every four reservists is not fully trained for his or her duty position. We have undertaken a detailed analysis of Army qualification data... our work shows that reservists may be less skilled than the Army's data indicate and the Army does not know how many reservists are proficient in their jobs.*

Given the stated mission objectives and the constrained training environment, it is not surprising that it has proved difficult to achieve the required levels of proficiency and overall readiness for the force. A number of GAO studies (GAO, 1988, 1989) have documented the depth and breadth of the problem.

The proficiency of active duty personnel is measured annually through a Skill Qualification Test (SQT) for each Military Occupational Skill (MOS). By regulation, Reserve Componets personnel are to be evaluated in the same manner but only about every two years. The GAO study revealed that at most 60% of the Reserve Componets were being tested (in some units only 35% were tested). For those tested, approximately 35% failed the SQT as compared to only 8% for the AC. First Sargents and Trainers shared the perception that only about 50% of the Reserve Componets are MOS qualified to accomplish their mission

objectives. The GAO study also found serious deficiencies in survival skill training including the finding that many NCOs, who are primarily responsible for providing survival skills training, lack the necessary skills.

Traditional Reserve Component Training Methods and Limitations

Time Constraints

Time to train is the most significant factor influencing Reserve Componets readiness. The limited training time is the foremost readiness determinant but; time cannot be substantially increased even if the required funds were available.

Reserve Component units are officially allocated 39 days per year for all activities. In practice, the average unit spends 41 days per year in some sort of collective training Preparation time, travel time, and administrative tasks further reduce the actual training time. At best, RC units have less than 25% of the training time available to active units.

The officially allocated 39 days per year are divided into two parts:

1) Annual Training (AT)

2) Inactive Duty Training (IDT).

The AT typically consists of 15 continuous days during the summer months at an RC or AC training area. These are essential activities, representing the only real opportunity for units to assemole at higher levels for collective training exercises. The remaining 24 days which are allocated to IDT are divided into discontinuous Unit Training Assemblies (UTA) of at least 4 hours duration. These are typically utilized as two-day weekends, although flexibility is permitted, the configurations of the instructional blocks place subjects into four hour time frames. In terms of financial implications, each four hour UTA can earn eight hours of pay for the RC soldier.

Because of civilian job requirements and family obligations, the 39-day limit cannot be significantly increased. For the typical RC member, even the 39-day requirement entails important family priority issues and civilian job risks not experienced by the AC.

Geographic Dispersion

The RC force is distributed into approximately 7000 units at over 4500 separate locations. The average distance between a unit and its next higher headquarters is 106 miles

with a driving time of approximately 2 1/2 hours. The typical battalion inclu[illegible] units spanning a geographic radius of 150 miles and some extend to over 300 miles. Significant travel is also required to virtually every training support facility: 40 miles to the nearest local training area, 128 miles to the major equipment concentration site, and 154 miles to the nearest major training area are fairly common scenarios.

The dispersion of RC units is driven by recruiting limitations associated with population density and the requirement for reasonable driving distances to training sites. In practical terms, these underlying factors are not subject to significant change.

The impacts of dispersion on RC unit training include the following:

1. Communication and coordination among and between units is made more difficult.
2. The frequency with which units can effectively use training facilities and areas are diminished.
3. The level of difficulty in providing support, evaluation, and other services to subordinate units is increased.
4. The ability of the next higher headquarters to influence training in person is diminished.
5. Reaction time to change is increased.
6. Major restructuring of forces (e.g. putting all divisions in single states) is precluded.
7. Training is, and must be, decentralized.

Turbulence

Because of the combined effects of attrition, reassignment within units, civilian job changes, and unit relocations, the RC force must deal with a high level of personnel turbulence. The average annual turnover rate, E-5 and below, is approximately 50%.

Unlike the active force, soldiers joining the RC units are typically not duty-MOS qualified. Some 40% have had no previous military experience and, even for those who have had prior service, a substantial fraction are not qualified in their assigned MOS's. As a result,

approximately 70% of all enlisted soldiers who join RC units each year require training to qualify for the MOS's to which they are assigned.

In addition to personnel turbulence, RC units must also contend with major structural modifications due both to changes in functional assignment and to the introduction of new equipment. In the next few years, many RC units will undergo one or more such structural changes, with major management and training implications.

The combination of discontinuous and limited training time, geographic dispersion, and personnel/structural turbulence creates a major administration and management workload affecting every member of the RC. As much as 50% of the total 39 days available for training is devoted to administrative matters. Weekend drill periods are especially affected.

Equipment Availability

The modernization of Army equipment, with a trend toward ever greater electronic complexity and general sophistication, creates major new training challenges. As an added compl.cation, many RC units have extremely limited access to the equipment they are expected to use to satisfy their mission objectives. For both cost and logistical reasons, this equipment cannot be geographically dispersed to the degree that optimal training access would require.

ARMY Training Strategy: Distance Training

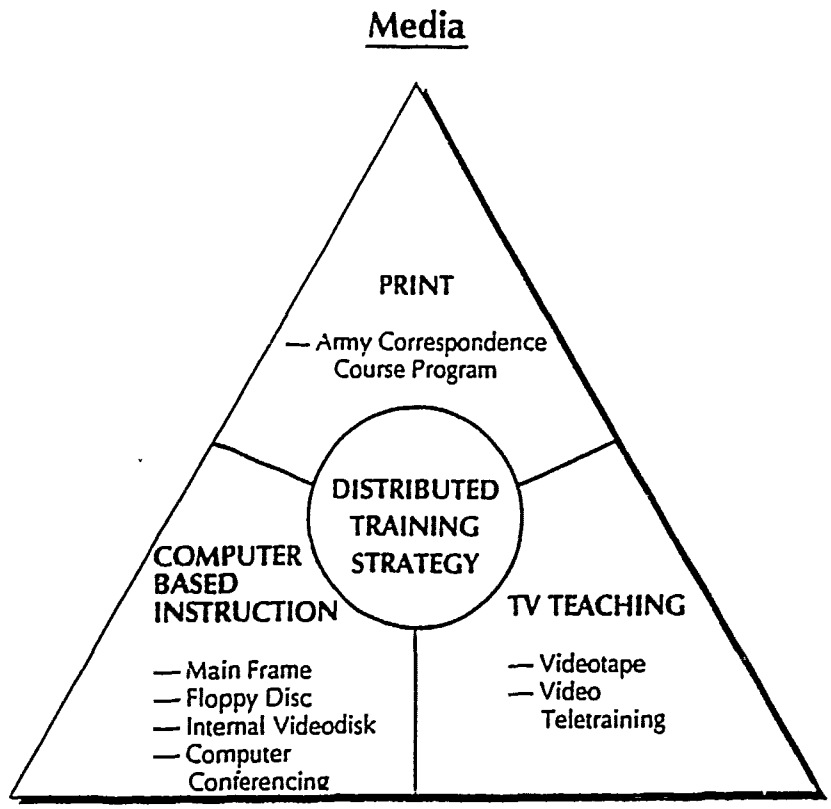
A member of Training and Doctrine Command (TRADOC) outlined their Distributive Training Strategy for the 90's at a recent national telecommunication conference. TRADOC strategy includes a total distribution package based on a long range plan dated 1989-2018.

The Army plan is an attempt at goals to include:

- worldwide distribution
- reach most students with fewer instructors through technology
- reduce cost through less personnel movement
- a duty station phase of instruction

The Army wishes to reduce the length of resident courses and the total training time for soldiers. A long term objective of TRADOC may be the reduction of total resident training time by 50% by the year 2007.

The Distributive Training Strategy is based on a multi-media approach, including print, computer based instruction, and telecommunication (TV) teaching (figure 1).



The strategy is based on phases, the emphasis is placed on analysis and evaluation in the early stages.

The idea seems to pilot test the distribution strategy, and then determine how best to make distributive learning work. First, to study proven distributive operations and gain experience in these methods. Second, evaluate the various distributive training programs to include pilot programs for effectiveness, retention, attrition, and performance.

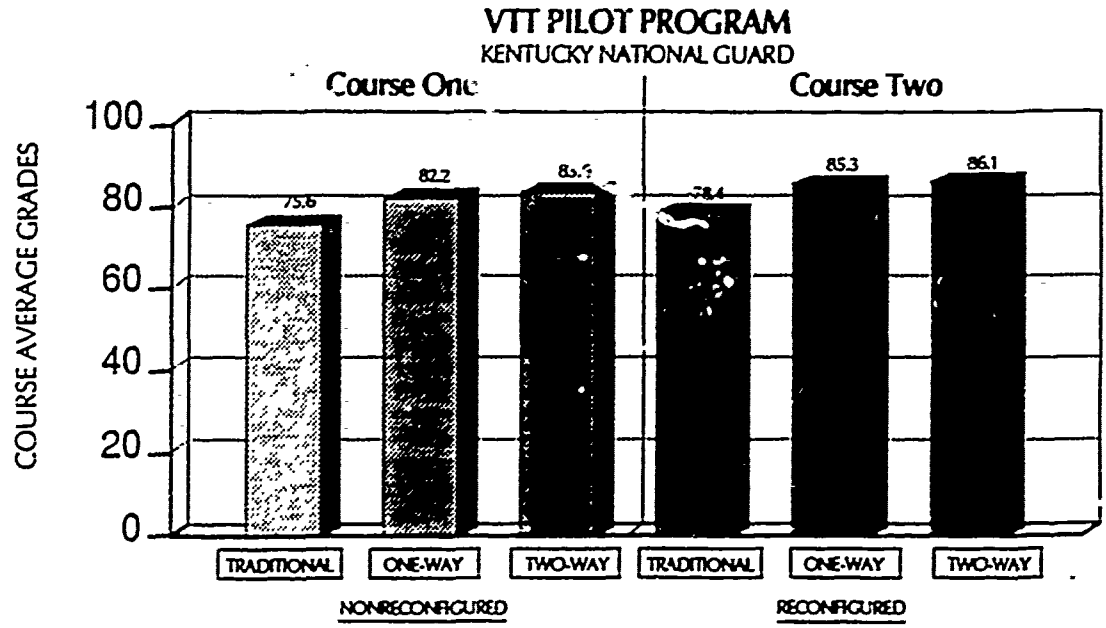
In the Army's pilot project for the National Guard, a Video Teletraining program was begun in the Kentucky National Guard in November 1990. The pilot was scheduled to end approximately July 1991. Also scheduled was a similar type of pilot for the active component from January 1991 to July 1991. The Kentucky pilot students consist of guard and reserve soldiers who are taking a telecommunication course in leader training (Basic Noncommissioned Officer's Course--BNOC). The video telecommunication experimental group test as reported by Kentucky National Guard, consisted of varying combinations of audio and video instruction (figure 2).

VTT BNCOC Presentation Matrix

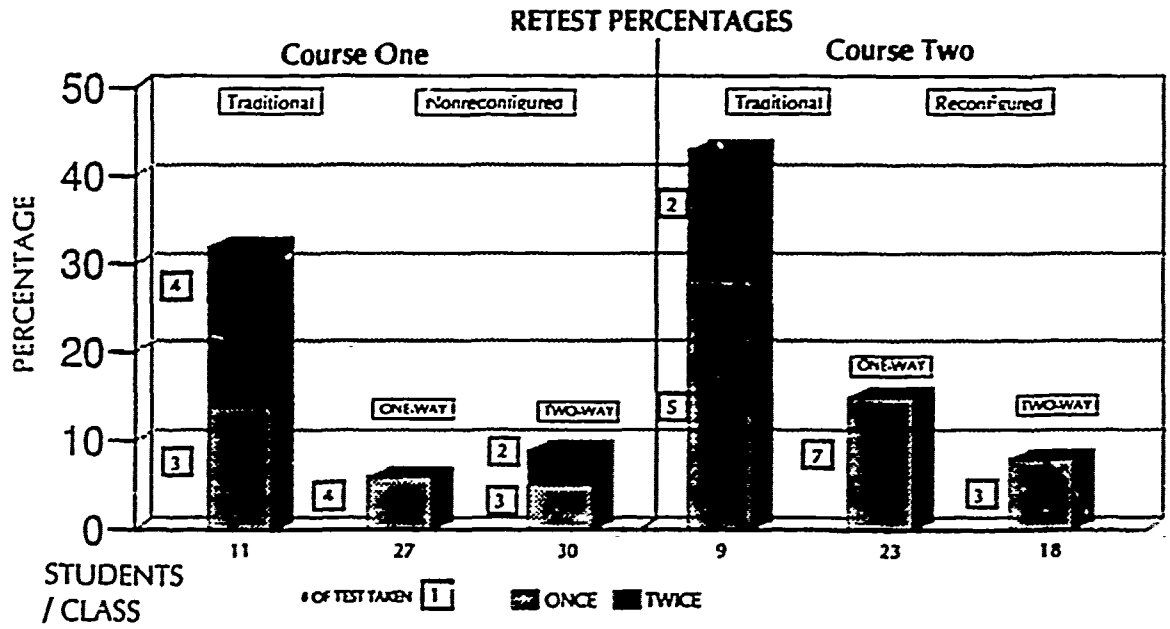
	Crse #1	Crse #2	Crse #3
Instructor Tm 1	One Way Video	Traditional	Two Way Video
Instructor Tm 2	Two Way Video	One Way Video	Traditional
Instructor Tm 3	Traditional	Two Way Video	One Way Video

Purpose of instructor rotations - focus on validity of media and eliminate instructor bias.

The control group receives instruction via standard resident instruction. Early results indicate video telecommunication (both one-way and two-way) to be better than traditional instruction (figure 3).



It was also found that the "retest" percentages were lower when using video telecommunication (figure 4).



For the Implementation Phase, the Army's plan is to determine the locations and numbers of military personnel to receive distributive training and establish learning centers to meet training needs. During this phase, the training sites will be established in the states and overseas as troop population and force structure dictate.

The Distributive Training Strategy for the Army is a sound plan and appears to be a good course of action for both active and reserve component soldiers. The strategy provides the following:

- flexibility to train anywhere
- reduces soldier time away from unit
- uses multiple delivery systems
- increases instructor efficiency (specialize)
- is manageable and cuts travel expense
- possible cost savings

Unofficial indications from the reserve component pilot test seem to indicate the telecommunication method of instruction is effective. Although no conclusions should be drawn from early results, it does appear the distance learning idea is worthy of further testing or implementation on a larger scale. It is understandable that the capable leadership at TRADOC wishes to maximize efforts to the active components; however, the reserve component will still compose about one half the force and should be given the opportunity to train to standards set by the active force.

ARNG Training Strategy (Reserve Components)

The telecommunication strategy has yet to be defined in a long range plan and is in a state of development. Presented here is not the National Guard Bureau plan, but rather the ideas of several individual guard states and a request for opportunity to receive top quality instruction through a less expensive delivery system.

Some reserve component combat units performed very well in combat in the Gulf War (Artillery) and some are still there providing top quality military functions. There is little question of the solid support afforded the total military force by reserve component support units in the Gulf War.

What has become an issue is the combat readiness of other combat units in the reserve component force. The units training at the National Training Center (NTC) have come under fire for not being evaluated as combat ready. There are arguments as to the true readiness of these units, depending on the particular military group questioned. The real point is were they combat ready by an unbiased evaluation on combat readiness.

The above discussion is the primary reason for an extensive testing and implementation of a revolutionary training strategy for the Reserve Componets. The reasoning or causes of the suggested lack of combat readiness are presented in detail later in this paper.

The telecommunication network proposed for the reserve force is much the same as has been reported in the active component telecommunication portion of their distance strategy. The areas that differ are in the extent of pilot testing. As example, the National Guard individual support would like to see a test in eight of ten states of different demographics dictated to the Army by Congress. Reasoning for the multiple state test is that the active component test is only in one state and utilizes only three sites. This does not allow generalizing ability of the findings and evaluation is in a test tube environment without diverse populations or organizations. The Reserve Componets have a large and varied number of

subjects/courses that are applicable to the telecommunication training system. Course selection would come from STRIPS workshops and the instruction of any one course could be broadcast nationally.

The non available training slots currently encountered by the Reserve Componets would be taught on a telecommunication network and remain in the sole control of active forces as they are at present. Long duration courses could be presented on the network and individual reserve soldiers could take these courses at their local armories. Other reason for a telecommunication network which would allow for serve forces training at home station are:

- Limited training time
- Dispersion of units (Approximately 100 miles)
- Better use of training time (less travel)
- "Top Gun" instruction
- Retention of soldier
- Better and more consistent evaluation of soldiers
- Cost savings
- Improved combat readiness

Several tests of the system were conducted prior to the current test in Kentucky, some of which were paid for by the states involved. In Oklahoma in 1989, a test was made by use of a special interconnection of state wide telecommunication distribution systems. The project interconnected satellite, micro-wave, telephone optical fiber and regular phone lines to allow the state's Adjutant General to address all the soldier in the state at their home armories. The address was followed by a class and open communications with all participating sites in the state. The important point is cooperation between the follow agencies to include payment of the project:

- Military Department
- State phone system
- Regents for Higher Education (Network & Chancellor)

- A major site university (Network)
- Other educational institutions (Receiving sites)

There were sites with over 100 participants and sites with as few as two individuals, none of the participates had to travel out of their local area. This test and other events with state governors participating indicate the support at the grass roots level. The problem in all the support for improved training of the Reserve Componets is that it is deluded and disappears at higher military training levels. The Army has fought the program of real telecommunication training from the inception of the cost saving idea.

Monies appropriated for extensive National Guard telecommunication testing have been held in limbo and creative distance training at the state level for National Guard and Reserves has not happened. States have two year training plans in hand for telecommunication training that would greatly improve readiness and reduce training time/cost (Appendix A). These training improvements are frozen at present and there is no a projected plan for spending the funds appropriated to the National Guard for telecommunication training (Appendixes B and C).

The National Guard training requirements opens the possibility for a network to reach not only to guard armories and reserve training centers; but, into the individual soldier's home. This home network is because of the cooperative attitude of state broadcasting networks and available assets of state educational systems. The National Guard Network desires investigation because of the cost savings and quality training programs for the individual soldier.

Telecommunication Network for ARNG

Training Strategy

The RC readiness objective require a break-through in training methods. The learning process must be accelerated to fit within the window of available time. There must be a bridge for geographic separation. The Army must compensate for limited hands-on training opportunities by better training methods and adapt to a wide range of skill levels and intellectual capacities. The implementation strategy uses state-of-the-art telecommunication systems and computer-aided-instruction (CAI) technologies to implement accelerated learning techniques in a cost effective training network. A dramatic improvement in training management is also planned, based on the use of a guard telecommunication network.

In many respects, improved training management is the most important single strategic objective. The RC environment is inherently fragmented and potentially chaotic. Without precise planning and careful management, the focus required for effective training cannot be achieved whatever the training method.

Methods of Accelerated Learning

(Master Teacher)

We have evolved from the one-room school house to the modern 16-year "educational factory". We have by far the most extensive, and expensive, public eduction system on the planet. Whatever the shortcoming in terms of educational practice, we have learned a great deal about human intellectual processes and about the factors which nurture rapid learning; but, often we do not use correct instructional methods.

As an example, a master instructor addressing learning modalities while instructing freshman college chemistry can produce 90% or more students achieving a passing grade. With an average instructor, 50% of the same type class will never make it past the mid-term. The master instructor knows how to hold the attention of the students and how to access the

required intellectual capacities for comprehension and retention. The master teacher concept has been adopted into the National Guard telecommunication instruction methods. He is the "Top Gun" instructor.

The master teacher is invariably a "showman" and adapts to his audience and therefore requires extensive feedback. The critical "charisma" which grabs and hold the attention of the students is a combination of body language, stage props, and student participation events. No two classes are ever the same. Routine factual instruction is assigned as homework based on a written text with homework based on a written text with the class sessions devoted to "bringing the subject alive", stimulating of a multitude of questions which lead to understanding and long term retention. The class environment is characterized by a high level of multimedia interaction between the teacher and the students.

Simulation Opportunities

Computer-based simulation has been extensively used for military training for many years. Extremely complex software systems have been created for wargame exercises, particularly in terms of command and control functions. Sophisticated hardware simulators (e.g. the M1 tank) have also been created which are substantially less expensive than the real physical system. Computer simulation is used to create backdrops (e.g. terrain maps) for various problem scenarios and to provide a variety of practice opportunities. In terms of educational impact, computer simulation (or, more generally, computer aided-instruction teacher). CAI is used for both logic exercises and as a replacement for "Hands-on" access to complex equipment. Simulation routine are useful at one or more levels for every MOS.

Because personal computer processing and display capabilities have dramatically improved with modest costs, and because relatively wide-band telecommunication links are also available at modest cost, it is practical to link general purpose work stations at geographically dispersed RC locations with the sophisticated simulation equipment at the various active force facilities. In this way, it is practical to create a hands-on substitute for RC training purposes

which provides essential practice and participation at the Annual Training opportunity. The effectiveness of AT can be boosted enormously in this way.

Effective RC Training Investment

All costs totaled about $11,000 per RC soldier for fiscal 1989 In effect, this $11,000 is the total expenditure for readiness training of the Reserve Componets.

Based on 39 days of training per year, the investment in RC training in the fiscal 1989 was approximately $282 per soldier per day or $35 per hour ($11,000/39 days/8 hours). If, as the GAO studies suggest, 50% of the available time is used for administrative matters, the equivalent cost for actual training activities approached $70 per student-hour.

Based on GAO findings, as many as 50% of the RC are not fully MOS qualified and a similar or greater number have inadequate survival skills. Therefore, given any particular fixed budget, it appears virtually certain t at the military effectiveness of the RC can be enhanced by reducing the total number of soldiers while increasing the level of training and readiness of the remaining force. This, of course, presumes that it is practical to significantly improve RC training and the corresponding state of readiness.

Given the trends toward increasing mission complexity and the consequences of error in terms of loss of life, damage to property and the attendant political complications, it is clear that a major effort to improve RC training and to validate mission-capable readiness on a continuing basis is fully warranted.

Course Development Factors

Approximately three hundred MOS exportable courses are currently available for RC use. If one includes all grade levels and all specialities, the total Army training requirement includes over 1000 topics of instruction. Given modernization trends, a relatively high change rate in many courses of instruction is certain. Further, this rate of change can be expected to accelerate over the coming decade due to both revised missions and new technology.

Since most RC mission-capable skills have high commonality with the active force, the basic written texts for most sources will exist independent of RC specific development efforts. From a cost perspective, effective use of this material with minimum modification should be activated.

Distance Learning Opportunities

In a distance learning environment, the opportunity is present to use a geographically dispersed teaching team to provide instruction in all learning modalities and to efficiently compensate for any shortfalls or required upgrades in the standard course content. Typically, several expert instructors would participate in guest appearances with a master teacher; their responsibility is to integrate all class activities into a single focused course. The student locations would be proctored by personnel with local training responsibilities to act as assistant instructors. Because of the focus on multiple learning modalities, approximately 50% of the class time will be devoted to peer instruction. Because the team of master teachers can be geographically dispersed and participate on a part-time basis, the distance learning environment facilitates a markedly higher quality of instruction which is critical to an accelerated learning program.

Through the use of personal computers, each participating instructor has the means to create appropriate supplemental course material to meet his or her needs in the context of the master teacher's custom "bag of tricks". In all of these classroom-focused activities, the geographically dispersed learning environment can be substantially more effective than a typical in-residence experience because of the practical limitations affecting the creation and maintenance of expert teams in any one location. The hands-on requirements create an additional challenge. Many elements of the Army hardware are expensive, and therefore available only in limited quantities. Reserve Components access to appropriate hardware for training is a very difficult problem. Computer-based simulation is a practical alternative for a telelearning environment.

Trains -- An Interactive Teletraining System

One proposed telecommunication program is Training Reserve by Interactive Network Systems (TRAINS). TRAINS is an interactive teletraining system comprised of four major modules: interactive video, interactive audio/graphic, interactive computer conference, and interactive course development (Appendix D). The modules are implemented using a state-of-the-art telecommunication network based on commercial geosynchronous communication satellites and Very Small Aperture (ground) Terminals (VSAT).

Given the requirement for an RC training system with break-through impact in terms of educational effectiveness, TRAINS was defined as the feature/functions necessary to support all learning modalities in the complex RC distributed environment. Various implementation strategies were evaluated to provide the required set of feature/functions at minimum cost. An elegant system architecture was configured with unexpectealy low cost per student training hour.

Cost Effectiveness Criteria

Given the [illegible]smal performance of the typical classroom in terms of educational effectiveness, as compared with a master teacher addressing all learning modalities, it is not surprising that the various distance education methods appear to provide comparable performance.

In the case of conventional RC training, the class duration, structure, and examination criteria are designed to assure that virtually all participants acnieve a minimum competence. The current investment in RC training is approximately $70 per actual student-training-hour and there are an insufficient number of available hours to achieve the required readiness levels. Therefore, a meaningful comparison with alternative systems requires that either class duration or the examination criteria, or both, be treated as variables.

Teletraining Environment Objectives

The feature/functions included in the TRAINS system were chosen to create a distance learning environment similar to in residence instruction by a master teacher. Such an environment must necessarily consider both the needs of the teacher and the needs of the students.

As stated earlier, the master teacher is invariably a showman who adapts to his audience and therefore requires extensive feedback. The critical charisma which grabs and holds the attention of the students is a combination of body language, stage props such as color graphics, special demonstrations and guest appearances, and student participation events. No two classes are ever the same. Routine factual instruction is assigned as homework with the class sessions devoted to bringing the subject alive, stimulating questions which lead to understanding and long term retention. The class environment is characterized by a high level of interaction between the teacher and the students, and this approach has now been proven in the distance learning classroom.

Computer Simulation

The key word is interactive for all modes. On an individual basis, these techniques are conventional with an extensive base of experience. The training effectiveness or operational utility is also proved for each and learning is best when distance learning systems are fully interactive.

The combination of modes offers unique opportunities. For example, the interactive video system may be used during a normal class session with the audio/graphic system used for homework exercises. Computer conference capabilities are used for administrative activities and the course development features for supplementary graphics to enhance a standard course offering.

Interactive Video

The interactive video component includes both near-full motion video (this is essentially 2-way live TV) and still-frame graphics on a second display. The motion video is compressed using digital processing techniques, permitted very cost effective transmission with minimal distortion. Only with rapid motion will blurring occur and this minimal.

All camera controls are available from a single, simple control box including pan, zoom and focus. A preview mode permits local viewing of the camera output. The normal graphics mode is still-frame with a significant resolution improvement relative to the motion video. Where required, the graphics image can be switched into an action graphics mode for annotation purposes although there is some loss in resolution.

The quality of the audio system is probably more important than the video .This system is all digital with no background "white noise". The microphone and speaker system is designed to work in conjunction with special echo cancellation electronics to minimize spurious feedback paths. The fidelity of the audio system is such that individual voice differences can be discerned to aid in speaker recognition.

Motion video, high-resolution graphics, and crystal-clear audio are the primary tools available to both instructors and students to establish an interactive learning environment. The intent is to create a conversation ambience more like a living room than a TV production studio. The feeling of eye contact with the instructor is actually superior to a typical classroom. The ever-present possibility of being spot-lighted by the instructor and the camera tends to keep everyone alert. Mini-presentations by students reporting on individual or small group homework exercises is a major facet of a well designed telelearning course. Active involvement of the students is the key to true learning and knowledge retention.

Interactive audio/graphics is a totally separate telelearning technology based on a personal computer with video or graphics display capabilities with an audio conference call environment for all participants. Normally, and audio/graphic class would be conducted in a separate classroom from the video equipment. The TRAINS telecommunication network can

accommodate the simultaneous operation of an audio/graphics class. This particular work station has an additional feature called a CD-ROM (compact Disc read-only memory) which can store vast amounts of video and graphics data with nearly instant recall capabilities. During a class session, all participating work stations are linked through a telephone line or local area network (LAN) to the TRAINS telecommunication link. When the instructor displays graphics on his personal terminal, the same graphics appear on all student terminals. All locations, students and teachers alike, have an identical capability. The control signals and the audio signals are mixed on a single channel. A graphics pad is used for input and control. The student would normally use a headphone for optimum audio performance.

The compact disk player provides access to a virtual smorgasbord of video and graphics data. For example, entire high-resolution video sequences can be presented as background for overlay exercises. These work stations can also be used for simulation exercises both individually and collectively.

Interactive Computer Conference

The third mode of interaction, termed computer conference, is a multi-user, time-shared mainframe system which provides text-based conference capabilities as well as electronic mail services. In addition, the mainframe computer capabilities can be used for test-generation purposes, thereby assuring that each student receives a unique set of examination questions. This system also serves a wide range of administrative functions for the instructors and training administrators.

Interactive Course Development

A final important function of the TRAINS system is course development. Currently, approximately 60% of each classroom training support dollar (excluding student labor costs) is allocated to course development and instructor costs. The $10 million provided to the National

Guard via the National Defense Appropriations Act and House Defense Authorization Bill afford course development dollars. It should be noted these funds have also been side tracked and are likely to disappear from the RC required actions.

TRAINS as a Teleport

From an overall system perspective, each local TRAINS site is in effect a teleport providing a wide range of interactive video and data services to create a versatile telelearning system which permits instructor and students to be geographically dispersed in an almost arbitrary fashion across all of the continental United States.

Space Segment Cost Estimate

The reduced band width requirement achieved through video and audio compression combined with the efficient network architecture result in a satellite communication services cost of less than $6000/mo/site.

TRAINS Networking (System of Systems)

The TRAINS system architecture includes interfaces or gateways with existing state-owned telecommunication systems, including instruction and/or educational TV, cable systems and satellite-based educational networks. This "system of systems" would be used primarily for broadcast events where minimum feedback is required. The key point is that existing telecommunication assets will be used to the maximum practical extent.

Mobile Configurations

All of the TRAINS capabilities can be provided by a mobile unit. The video equipment can be dismounted and moved into a conference room or classroom. The VSAT antenna is trailered behind the audio-graphic work stations are mounted in an environmentally-controlled trailer. This mobile configuration will be used in low-density areas where permanent installations cannot be justified. Equipment set-up and satellite acquisition take only a matter of minutes.

SIMNET

Simulation is a critical training tool in almost all courses of instruction. It is the only practical substitute for the truly hands-on experience which is all too often prohibitively expensive. The TRAINS network can be used in conjunction with SIMNET to create almost arbitrarily large simulation exercises involving all levels of personnel.

Training Method Cost Comparision

IDT training time is both very limited and discontinuous. For reference purposes, several previous studies have identified total costs for in-residence instruction, including student per diem but excluding student labor costs, to be in the range of $15 to $30 per hour depending upon overhead allocations. The most relevant reference is the current average total investment of between $35 and $70 per actual training hour (IDT and AT) for RC soldiers.

Training Time Allocation Assumptions

Based on the GAO findings relative to personnel turbulence, it is reasonable to assume at 35% of the RC force will require training in a new MOS each year. Further, given the GAO general findings that 50% of the RC are not fully qualified, it is reasonable to assume the another 15% need specific MOS retraining (35% requiring MOS training plus 15% retraining requirement equal 50%). It is further assumed that all members of the RC need refresher training each year equivalent to a 60 hour course. Therefore on the average each RC soldier is assumed to be require 90 hours if IDT instruction each year divided equally between classroom sessions and computer simulation activities (i.e. all RC soldiers require 60 hrs/yr and 50% of the force require an additional 60 hrs/yr).

Therefore, for system cost analysis purposes, the RC training year is divided as follows:

Annual Training (AT)	15 days
Inactive Duty Training (IDT)	
Classroom	6 days
Computer Simulation/CAI	6 days
Field Exercises	8 days
Subtotal	39 days
Homework	6 days
Travel (32 UTA's , One hour round trip)	4 days
Effective Total	49 days

The additional six days allocated for homework is possible only because the stakes can be completed with minimum interference to family activities. An average of 30 minutes (one-way— driving time is assumed for 4-hour Unit Training Assemblies (UTA) which would apply to classroom sessions, computer simulation exercises and administrative tasks but not to field exercises.

Training Schedule Assumptions

If the RC training calendar is comprised of 48 weeks for Inactive Duty Training (IDT) and two continuous weeks (usually in the sumer) for Annual Training (AT). The 48 weeks of IDT have the following training time windows:

Monday - Thursday	1800-2200	16 hours
Saturday	0800-2200	12 hours
Sunday	1300-2200	8 hours
Total Weekly Window		36 hours
		x 48 wks/yr
Total IDT Training Window		1728 hrs/yr/classroom

Training Demand Assumptions

Using simulators, guest lecturers, live video field demonstrations, etc., it is possible through the TRAINS system to distribute a much broader cross-section of course topics.

To support the existing USAF school training program, TRADOC has converted only approximately 325 of the 1013 or so non-entry level courses into exportable packages ceases to be a limitation. In fact, with the probable reductions in active force manpower and the corresponding reduction in school training loads, it is reasonable to assume that TRADOC school instructors will have more time to participate in RC training through TRAINS. This has not been possible in recent years when the schools have been loaded to full capacity and beyond.

With TRAINS, RC training topics can be covered in combined distributed IDT program and the in residence program. Final certification for many MOS courses would occur during AT.

Given that each RC soldier requires 90 hours/yr of classroom and computer simulation instruction, the total RC IDT training demand (Field exercises excluded) is as follows:

520,000 soldiers

x 90 hours

46,800,000 IDT student hrs/yrs of classroom and computer simulation work

Satellite-Based Networks

Very Small Aperture Terminals (VSAT) can be used with geostationary satellites to create a versatile TRAINS network. Assuming a five year amortization period, the cost of the VSAT equipment is approximately $1,000 per month per site. TRAINS space segment usage charges for 24 hours per day access are approximately $6,000 per month per site dropping to perhaps $900/mo/site to $2500/mo/site depending upon usage requirements. Shared use of the TRAINS facilities could further reduce RC training telecommunication costs to a few hundred dollars/mo/site.

Summary to Telecom Options

Given the geographic dispersion of the RC training sites and the network data rate requirements, there are no known existing or planned terrestrial telecommunication services, or switched commercial service of any nature, which appear cost competitive with a dedicated VSAT-based network for at least the next five to ten years.

RC Component Training Conclusions

RC Readiness Status

Due largely to training deficiencies, the Army Reserve Component cannot fulfill critical mission objectives. Only approximately 50% of the RC are MOS qualified to accomplish their assigned duties and an even lesser number have adequate survival skills.

A "Breakthrough" Training Strategy

A dramatic improvement in RC training effectiveness can be achieved through the use of mixed-media telelearning techniques. Achieving and maintaining an acceptable level of RC readiness is believed to be a practical objective in spite of both the 39 day time constraint and the geographic dispersion problems.

Instruction is provided by a geographically distributed teaching team lead by a master teacher. Accelerated learning methods are used including guest lectures by "top gun" instructors, computer-based simulation exercises, "live" video field demonstrations, interactive video/high resolution graphics for all classroom sessions, and "homework" based on printed text. Because of the mixed media approach and the use of Training and Doctrine Command Non Commissioned Officer Academy master teachers, a large proportion of MOS courses can be distributed with final certification during summer AT. The training program is not limited to existing "exportable" courses. The proposed advanced telelearning system is acronym TRAINS.

Cost Estimates

The five year life cycle total cost of TRAINS is approximately $8 per student-hr. under very conservative system utilization assumptions. For reference purposes, this is less than 50% of the cost of conventional in-residence instruction. With reasonable shared use of RC facilities, the TRAINS costs decrease further to approximately 30% of the cost of conventional

in-residence instruction. However, independent of cost considerations, it is important to recognize that because of the RC training time constraints, in-residence instruction is not a possible alternative for IDT requirements.

The most significant cost comparison basis is the effective investment of $35 to $70 per actual training hour derived from the total Army RC annual budget. Given that 50% of RC personnel are currently not MOS qualified for their mission assignments, it is almost certain that the military effectiveness of the RC can be significantly increased by shifting budgetary priorities to reduce the number of RC soldiers while increasing the individual competency level of the remaining force through additional training. A manpower reduction on the order of five to ten percent would fully fund the implementation of TRAINS serving all 4600 RC facilities in the Continential United Status. A similar argument would hold for reductions in active force personnel with increased RC responsibilities and a net increase in Reserve Componets.

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***Since I couldn't determine what type publication: the press, etc., I could not do a correct APA bibliography.*

APPENDIX A

Telecommunication Implementation Plan

This is an outline of the implementation of a telecommunication programming that is well within the capacity of this organization to perform. The program was established for TY 89 and placed on hold by higher headquarters. This same action was conducted for TY 90 and TY 91 with the same delay from higher headquarters beyond state levels.

1. The Oklahoma Military Academy will be preponent for all activities.

2. Site locations were selected based on course requirements for training and student population. Eight sites were selected for the proposed two year test of training via telecommunication.

3. Applications currently planned include but are not limited to:
    a. Reserve Component Instructor Training Course (ITC)
        1. Forty hours of instruction with 32 hours conducted at site locations and eight hours at the preponent installation.
        2. Three iterations for the remainder of TY 91 and six iterations scheduled tor TY 92.
        3. Student population will be approximately 32 per course iteration.

    b. Reserve Component Basic NCO Courses
        1. Forty-three hours of instruction with 35 hours conducted at site locations and eight hours at the preponent installation.
        2. One iteration for the remainder of TY 91 and four iterations scheduled for TY 92.
        3. Forty-eight students per iteration.

    c. Reserve Component Advanced NCO Courses
        1. The course will be 109 hours of instruction with 80 hours at site locations and 29 hours at the preponent installation.
        2. Two iterations are scheduled for TY 92.
        3. Student population will be 15 per course iteration.

    d. Reserve Component First Sergeant Course
        1. Eighty hours of instruction at site locations
        2. One iteration for TY 91 and two in TY 92
        3. Student population will be eight per iteration.

e. STRIPES Workshop
    1. Eight hours of conference at sites
    2. One iteration for TY 91 and two iterations TY 92
    3. Attendance per iteration 32 personnel.

f. Army Training Management System Workshop
    1. Pending lesson development.
    2. Two iterations scheduled for TY 92
    3. Student population will be commensurate with staff level of workshop--estimate 24 for first iteration and 50 for second iteration.

g. School house to the Soldier Progress Review
    1. One hour conference
    2. iterations and populations TBD

h. Non Prior Service Orientation Course
    1. Twenty four hours of instruction with eight hours of instruction at the site and the remainder at preponent locations.
    2. Six iterations for TY 91 and 11 iterations are scheduled for TY 92
    3. Student population will be 60 per course iteration

i. Transpertion Course
    1. Twenty-four hours per course all at sites.
    2. Develop unit movement plan for local commander.
    3. Student population 60 students.

j. Military Occupational Skills
    1. Course TBA include IN,FA, 91A & 91B

This shared concept is new and has potential for various military and special educational programs. If a system were available during the Gulf War, military families could have had direct reenforcement and support at home. It may not be feasible, but it is worthy of consideration and possible testing.

101st Congress
2d Session | HOUSE OF REPRESENTATIVES | Report
101-822

DEPARTMENT OF DEFENSE APPROPRIATIONS BILL, 1991

REPORT

OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

[To accompany H.R. 5803]

GUARD AND RESERVE FORCES

ARMY NATIONAL GUARD

Interactive Video.—The Committee believes that distributed training has proven to be an effective and cost-efficient means of instruction which can be used to maximize the very limited training time available to the reserve forces. As utilization of the reserve components becomes ever more significant in the Nation's "total force" policy, training deficiencies and readiness standards of the reserve components are ever more significant.

The Committee supports the Interactive Video Telestraining Program for the Army National Guard as a means of making full use of limited training time, maximizing the use of top-notch military instructions, and minimizing training costs. Therefore, the Committee directs the Army to transfer $10,000,000 out of Operation and Maintenance, Army in order for the Army National Guard to test the Interactive Video Telestraining Program. In order to provide sufficient test results to evaluate this program, the test should include 8 states, with a minimum of 10 sites per state. Upon successful completion of this test, the Committee expects the Department to include funding to continue the program in future budget requests.

101ST CONGRESS
2d Session | HOUSE OF REPRESENTATIVES | REPORT
101-938

MAKING APPROPRIATIONS FOR THE DEPARTMENT OF DEFENSE

OCTOBER 24, 1990.—Ordered to be printed

Mr. MURTHA, from the Committee of Conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 5803]

44

TITLE II

OPERATION AND MAINTENANCE

OPERATION AND MAINTENANCE ISSUES

The language and allocations set forth in House Report 101-822 and Senate Report 101-521 should be complied with unless specifically addressed in the accompanying bill and statement of the managers to the contrary.

APPENDIX C

House Armed Services Committee

Defense Authorization Bill - 1992

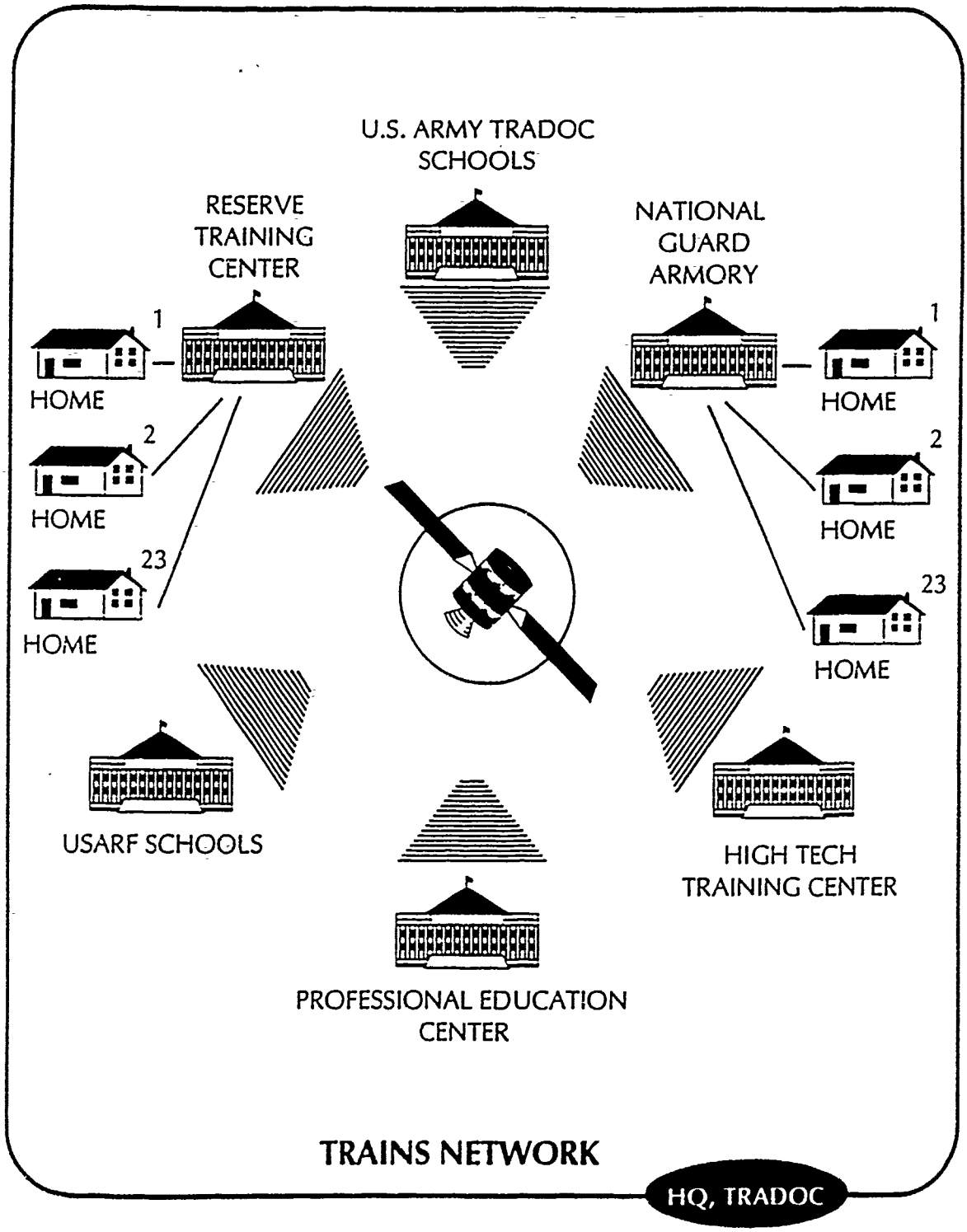
Army National Guard

Distributed Teletraining

The National Defense Authorization Act for Fiscal 21991 (Public Law 101-510) endorsed the use of distributed teletraining by the national guard and reserves and encouraged the National Guard Bureau to take full advantage of available teletraining technology. Oklahoma State University (OSU) was selected as the prime contractor for the Interactive Video Teletraining (IVT) program and participates with the Army in this effort. The Appropriations Act for fiscal year 1991 (Public Law 101-511), which provides $10,000,000 to expand this program and assure a statistically meaningful number of sites and courses. The National Guard and the Defense Language Institute. The committee anticipates continued success in other courses of instruction with a potentially revolutionary impact on critical national guard and reserve training.. The Army has not yet implemented the program and appears to be disregarding the recommendations and directives of the Committees on Armed Services of the Senate and House of Representatives. The Army has not transferred the designated approoriated funds to the National Guard Bureau as directed and is delaying expanded implementation of this important program.

The committee is disturbed with the inaction of the Army in this matter and directs that congressional intent as specified in the Department Defense Authorization and appropriation acts for fiscal 1991 be implemented without further delay.

APPENDIX D


U.S. ARMY TRADOC SCHOOLS
RESERVE TRAINING CENTER
NATIONAL GUARD ARMORY
1
HOME
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HOME
USARF SCHOOLS
HIGH TECH TRAINING CENTER
PROFESSIONAL EDUCATION CENTER
TRAINS NETWORK
HQ, TRADOC